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AN EVALUATION OF DWARF MISTLETOE IN CEDAR GROVE CAMPGROUNDS

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ABSTRACT

Four campgrounds in the Cedar Grove area of Sequoia-Kings Canyon National Parks were examined for dwarf mistletoe. Various intensities of infection were found in each campground on ponderosa, Jeffrey and sugar pines and white fir. In most cases both the overstory and understory were affected. Considering the current situation and expected future effects of mistletoe on the area, a control program at this time would be very beneficial. Guidelines and procedures for a suppression project are included.

INTRODUCTION

During the week of May 4, 1981 John Pronos and David Schultz, Forest Pest Management pathologist and entomologist respectively, examined the four campgrounds at Cedar Grove. One purpose of the examination was to assess the status of dwarf mistletoe and other pests on conifers. Infections were present in all of the campgrounds and appeared to be concentrated in a strip adjacent and parallel to the main highway.

Ponderosa and Jeffrey pines were the two most seriously affected species, with lesser infection in sugar pine and white fir. Trees of all size classes in both the overstory and understory were infected. We used the Hawksworth 6-Class rating system to estimate dwarf mistletoe severity. All levels of infection (light, moderate and severe) were found within the campgrounds, with light and moderate ratings most prevalent. Observations from other areas in the Sierra showed that many severely infected dwarf mistletoe trees died during or immediately after the drought years of 1975 and 1976. This may have also occurred in Cedar Grove, resulting in few trees with severe ratings.

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If dwarf mistletoe is not controlled it will continue to intensify, spread to healthy trees and deteriorate trees already infected, making them more susceptible to insect attack. The eventual outcome will be large openings without conifers. Severely infected trees usually die within 10-15 years unless environmental stresses such as drought or overstocking accelerate this mortality. The effects of dwarf mistletoe are not dramatic or immediately obvious to the casual observer but take place over many years. Control programs, therefore, are investments in the future health of campground trees, and we certainly encourage the Park to consider treatment. Thorough and aggressive programs can be very successful in reducing mortality and infection levels while increasing tree vigor and longevity.

BIOLOGY OF DWARF MISTLETOE

A knowledge of dwarf mistletoe biology will help to understand control strategies and make sound decisions on tree and stand treatments. These mistletoes are parasitic seed plants that attack only conifers. They are obligate parasites which are dependent on their host for support, water, and most of their minerals and organic nutrients. In advanced stages the dwarf mistletoes often cause the formation of witches' brooms, or dense masses of distorted branches, on the host that divert nutrients and water from the rest of the tree.

Dwarf mistletoes spread between trees and within tree crowns by means of forcibly ejected seeds. Horizontal spread, therefore, is limited to the distance traveled by seeds, usually 20-60 feet, but as much as 100 feet if carried by the wind. Upward spread within a tree is usually from 4 to 6 inches per year. It may take between 3 and 5 years from the time a seed infects a twig until plant shoots are easily visible. These non-visible infections are called "latent infections."

At Cedar Grove there are three distinct species of dwarf mistletoe, one infecting ponderosa and Jeffrey pines, one infecting only sugar pine and the third infecting only white fir. Because these mistletoes are host specific they will not cross over to affect other tree species.

PROCEDURES FOR DWARF MISTLETOE CONTROL PROGRAMS

Dwarf mistletoe treatments in recreation areas and timber stands may include:

1. Removing infected overstory trees to protect regeneration.
2. Removing witches' brooms from trees.
3. Removing infections by pruning.
4. Removing heavily infected trees.

5. Thinning to remove infected trees and release residual trees.

6. Creating buffer strips.

7. Favoring resistant species (includes planting).

8. Destroying heavily infected stands and regenerating.

The first step in a control program for campgrounds is to map the areas of infestation. Then each infected tree must be examined to decide whether to remove the mistletoe or to remove the entire tree. In making these decisions the guidelines below should be used. High-value trees and special situations may require deviation from these generalizations. However, deviations should be kept to a minimum in order to maintain treatment effectiveness.

1a. Trees with a dwarf mistletoe rating (DMR) of 3 or less - prune off all lower branches, both healthy and diseased, at the bole up to and including the second whorl of branches above the highest visible mistletoe infection. Experience has shown that removing branches only up to the highest infection or even one more whorl almost certainly results in latent infections appearing in 3-5 years.

b. Trees with a DMR of 4, and no mistletoe in the upper 1/3 of crown - prune to remove infections or take tree out depending on the condition of crown, tree vigor, distribution of mistletoe and importance of tree.

c. Trees with a DMR of 5 or 6 - remove.

2 . A tree should have at least 30% live crown after pruning.

3 . Whenever possible avoid removing more than 50% of a tree's live crown.

4 . Bole infections - if the stem diameter at the point of infection is less than 6 inches, remove the tree. Bole infections are not serious from the standpoint of spreading mistletoe but they deform and/or lead to mortality in small trees.

5 . Branches 1 inch or less in diameter with mistletoe plants within 6 inches of the bole are not prunable because the parasite is probably already in the bole. For each 1-inch increase in branch diameter, the minimum safe distance for pruning increases 2 inches.

6 . Removing witches' brooms from large high-value trees will increase the vigor of the trees. It may not be possible or acceptable to remove all additional branch infections.

7 . Some infections may be left in desirable isolated trees where there are no susceptible trees within range of remaining mistletoe shoots/seeds. This is often the case when broom pruning is used. Remember that the three mistletoe species at Cedar Grove will not cross over to non-host trees.

8 . In very dense aggregations it is often best to thin out infected trees even though they are prunable. Make decisions based on tree vigor, spacing, and expected response of residual trees.

9 . Buffer zones, defined as areas free of susceptible hosts, are essential to prevent mistletoe from re-entering the control area. Examples include meadows, roads, rivers, clearings and plantations of non-host trees. The Cedar Grove campgrounds have a unique situation with the locations of the Kings River and main highway which can be used as a part of buffer zones. Construction of new roads, structures or campsites can also be used to create buffer zones.

10 . Definitely plan to re-enter and treat the campgrounds in 3-5 years to remove previously undetected latent infections. Dwarf mistletoe cannot be eliminated with one entry.

Bear in mind that dwarf mistletoe is only one of numerous pests present in Cedar Grove, and that mistletoe control is done ideally while considering all pests within a complete vegetation management strategy.